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ITEM VOID

CODE No. 27-31

# Sensing the bends in a hidden stirrer

New Scientist

20 June 1968

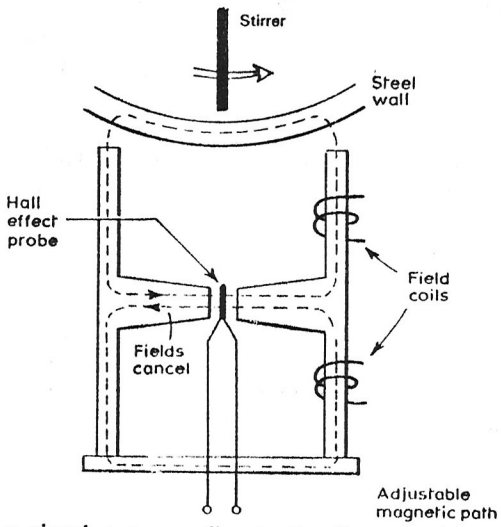
New Scientist 20 6 68

UNITED KINGDOM

## Sensing the bends in a hidden stirrer

Some of the materials that have to be mixed in the normal course of work at the Explosives Research and Development Establishment, Waltham Abbey, Essex, can become extremely viscous—so much so that there is a danger of the mixer blades being seriously distorted, and perhaps even striking the walls of the mixing vessel. The blades are of course not directly visible, so some means had to be found of sensing the distance between the moving blade-tip and the wall. Some form of magnetic system seemed reasonable, except that the wall is usually steel, presenting an obstacle to magnetic communication with anything inside the vessel.

The solution to the problem is shown in the diagram. A magnetic insert is attached to the tip of the blade, and a Hall-effect probe gives




a signal corresponding to the distance of the tip each time it comes round (in a Hall-effect device, a current is passed through a conductor, and a voltage is observed, perpendicular to the current, proportional to any surrounding magnetic field). Now, as has already been implied, the field at the Hall probe is dictated mainly by the presence of the steel wall. This contribution is removed by balancing it against an equal and opposite effect, generated in a magnetic circuit that is symmetrical with the circuit linking the probe to the stirrer.

The way this works in practice is that first the Hall probe works on an alternating current, and only voltage signals coming from it at the same frequency are recorded. A pair of coils generates steady magnetic fluxes in the two symmetrical magnetic circuits; the strengths of these can be made exactly equal by careful adjustment of the piece of ferromagnetic material (steel, or something magnetically similar) that closes the compensating magnetic circuit. The system, which may be completed by a meter calibrated for distance measurement and an alarm, is the subject of a patent application.